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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/665,911	09/20/2000	Yasuhiko Nomura	001221	5447
23850	7590	11/05/2003	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP			LANDAU, MATTHEW C	
1725 K STREET, NW			ART UNIT	
SUITE 1000			PAPER NUMBER	
WASHINGTON, DC 20006			2815	

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/665,111

Applicant(s)

HOTALING, EDDIE

Examiner

Matthew Landau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-10,13 and 15-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-10,13 and 15-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Claim Objections***

Claims 1, 8, and 10 are objected to because of the following informalities:

In regards to claim 1, the limitation “a second current blocking layer formed on said first current blocking layer...” appears twice in the claim. It is suggest Applicant remove any redundant limitations.

In regards to claim 8, the limitation “whereinthe” should be corrected.

In regards to claim 10, the claim is objected to because the amendment is not in proper format. Not all changes made to the claim have been properly indicated. Furthermore, the limitation “wherein said first current blocking layer is composed of a high-resistive nitride based semiconductor containing impurities” is redundant and should be removed from the claim.

Appropriate correction is required.

### ***Double Patenting***

Applicant is advised that should claims 1, 3, and 5-9 be found allowable, claim 10, 13, and 15-19 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k)

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5-7, 9, 10, 15-17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano et al. (US Pat. 5,998,810, hereinafter referred to as Hatano).

In regards to claims 1, 9, 10, and 19, Figures 3A-G of Hata disclose an active layer 4 composed of a nitride based semiconductor (InGaN); a cladding layer 55 formed on said active layer, composed of a n-type nitride based semiconductor (AlGaN) (column 7, lines 59-62), and having a flat portion and a ridge portion formed on the flat portion; and a first current blocking layer 77 formed on said flat portion and on sidewalls of said ridge portion of said cladding layer and composed of a high-resistive nitride based semiconductor (AlGaN) containing impurities (Mg); and a second current blocking layer 66 formed on said first current blocking layer and composed of a p-type nitride based semiconductor (AlGaN) (column 8, lines 18-20); wherein the cladding layer is composed of  $\text{Al}_{0.1}\text{Ga}_{0.9}\text{N}$ ; and wherein the first current blocking layer is composed of  $\text{Al}_{0.15}\text{Ga}_{0.85}\text{N}$ , which has a larger Al composition ratio than that of the cladding layer. The difference between Hata and the claimed invention is the impurities containing at least one of zinc, beryllium, calcium, and carbon. Hatano discloses a p-type AlGaN layer 44 containing Mg and carbon impurities (column 10, lines 20-22). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify

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the invention of Hata by including carbon impurities in the first current blocking layer. The ordinary artisan would have been motivated to modify Hata in the manner described above for the purpose of forming a deep acceptor level thereby compensating the residual donors (column 10, lines 24-29).

In regards to claims 5, 6, 15, and 16, Hata discloses the thickness of said first current blocking layer 77 is 1 micron (column 8, lines 23-25).

In regards to claim 7 and 17, Hata discloses the thickness of the flat portion of said cladding layer 55 is 0.1 (column 8, lines 10-15).

Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view Hatano as applied to claim 1 above, and in further view of Johnston, Jr. et al (US Pat. 4,888,624) hereinafter referred to as Johnston.

A further difference between Hata and the claimed invention is the first current blocking layer with a resistance value of not less than  $1.5 \Omega\text{-cm}$ . Johnston discloses a current blocking layer 20 having a resistivity of at least  $1 \times 10^6 \Omega\text{-cm}$  (see column 6, lines 34-40). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Hata to include a current blocking layer with a resistivity value greater than  $1.5 \Omega\text{-cm}$ . The ordinary artisan would have been motivated to modify Hata in the manner described above for at least the purpose of increasing the effectiveness of the current blocking layer.

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Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano as applied to claim 7 above, and in further view of Hiroyama et al.

A further difference between Hata and the claimed invention is the flat portion of the cladding layer having a thickness not more than  $0.08\text{ }\mu\text{m}$ . Figure 1 of Hiroyama et al. discloses a cladding layer 7 with a flat portion 7a and a ridge portion 7b, whereby the thickness  $t$  of flat portion 7a is selected to be not greater  $0.08\text{ }\mu\text{m}$  (see column 10, lines 22-27). In view of such teachings, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Hata by decreasing the thickness of the flat portion to a value not more than  $0.08\text{ }\mu\text{m}$ . The ordinary artisan would have been motivated to modify Hata in the manner described above for the purpose of increasing the real refractive index difference of the active layer between the region under the ridge portion and the region under the flat portion.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (703) 305-4396.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached

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on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
**GEORGE ECKERT**  
**PRIMARY EXAMINER**

Matthew C. Landau

Examiner

October 31, 2003